DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Specification

2. Applicant amended the Specification such that the previous objections are withdrawn.

3. Specifically, the Specification was objected to as failing to provide proper antecedent basis for the claimed subject matter shown below. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Applicant amended the Specification, as indicated.

a. Member with air supply holes – Claims 29 and 37. In the patentability analysis, the examiner interpreted this as the media fixing plate 12 with air supply holes 14 recited in the specification and shown in Figs. 6 and 7. Applicant amended the Specification, ¶ 35, to provide proper antecedent basis.

b. Annular device – Claim 43. In the patentability analysis, the examiner interpreted this as the density control plate 9 recited in the specification and shown in Figs. 2 and 10. Applicant amended the Specification, ¶ 44, to provide proper antecedent basis.

c. Array of openings in a circumferential band – Claims 31 and 46. In the patentability analysis, the examiner interpreted this as the supplied water passing holes 8 in the elongated housing forming main body 1 recited in the specification and shown in Figs. 2 and 9. Applicant amended the Specification, ¶ 47, to provide proper antecedent basis.

d. Annular plate – Claim 52. In the patentability analysis, the examiner interpreted this as the density control plate 9 recited in the specification and shown in Figs. 2 and 10. Applicant amended the Specification, ¶ 44, to provide proper antecedent basis.

Claim Rejections - 35 USC § 103
Fine Filtering Apparatus Recited In Claims 25-33, 34-40 and 53

4. Independent claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002), in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Spekle et al. (U.S. Patent No. 4,219,426, Aug. 26, 1980) to teach it is known in the art to extend the header jacket around the second end portion of the housing.

5. Below is a key which matches the recited structure to that of the prior art. After that, the claims will appear in *italics* with the keyed structure underlined. The examiner's comments will appear in normal font.

Table 1: Key to match claimed structure to that of prior art.

Claimed Structure	Specification Support	Prior Art Structure in Boye
Filtering apparatus	Fig. 2, filtering apparatus 100.	Figs. 1-4, filtering device.
Housing with cavity.	Fig. 2, housing forming a main body 1 (¶ 44, line 3) and a main body forming a treatment cavity (¶ 31, line 2).	Fig. 1, holding member 9 that includes housing member 1.
Water inlet.	Water inlet is Fig. 2, water inlet 2.	Water inlet is Fig. 2, fluid inlet pipe 48.
Clarified water outlet.	Clarified water outlet is Fig. 2, discharge pipeline 3.	Clarified water outlet structure shown in Fig. 2, before valve 65 connected to pipe 64 leading to filtered fluid container 70.
Waste outlet.	Waste outlet is Fig. 2, waste outlet 5.	Waste outlet structure shown in Fig. 2, before valve 62 connected to pipe 61 leading to deposit container 60.
Air inlet.	Air outlet is Fig. 2, air supply pipeline 4.	Air inlet is Fig. 2, inlet 66.
Fibers.	Fig. 2, fiber filter media 6.	Fig. 1, fibers 2 that "may be solid or hollow." Boye, p. 7, line 7.

Water guide jacket	Fig. 2, water guide jacket 7.	Fig. 1, structure that surrounds inlets 6.
Header jacket	Fig. 2, filtrate discharge jacket 16.	Fig. 1, includes structure shown at arrow exiting the filter device. Waste outlet structure shown in Fig. 2, before valve 62 connected to pipe 61 leading to deposit container 60. Clarified water outlet structure shown in Fig. 2, before valve 65 connected to pipe 64 leading to filtered fluid container 70.
Density control plate	Fig. 2, density control plate 9.	Fig. 1, compressing means 7a and 7b, first inner collar 11 and second inner collar 12; Fig. 3, compressing means 303, ring 314. Raff et al., Fig. 7, ring 6b.
Media fixing plate Air supply holes	Fig. 2, media fixing plate 12. Figs. 6-8, media fixing plates 12a, 12b, and 12c with air supply holes 14.	Fig. 1, black rectangle at inlet end 5. Air supply holes – Zha et al., Fig. 9, and col. 8, lines 20-27, aeration holes 52 where "the lower potting head 48" has "fiber membranes 53 [that] are potted in bundles 46 to form a partitioned arrangement having spaces 54" and "there is generally a number of aeration holes associated with each space."
Porous chamber	Fig. 2, porous chamber 10.	Barzuza et al. teaches that it is known in the water filtration art to place a skirt of solid flexible fibers (fibers 6) around a porous chamber (filter tube 2 having perforations 4). Barzuza et al., col. 1, lines 9-10; Figs. 1 and 20-23; col. 3, lines 1-4.

Claim 25. (Currently Amended) A fine filtering apparatus for removing fine particles from water, the device comprising:

a. *an elongated housing forming a main body and having an impervious wall enclosing an interior cavity that extends through the housing;*

b. *a plurality of flexible fibers extending within the cavity for contacting flowing water and removing fine particles from the water without separating a permeate from the water;*

c. *the housing including a pair of opposed end portions wherein disposed adjacent a first end portion is a water inlet for receiving a stream of water, the inlet including an annular water guide jacket extending around the first end portion of the housing and being in fluid communication with the cavity for distributing the water within the cavity;*

d. *a header jacket disposed extending around a second end portion of the housing;*

e. *the header jacket including a clarified water outlet for discharging a clarified water from the cavity;*

f. *the header jacket also including a waste outlet for discharging a concentrated waste from the cavity;*

g. *an air inlet for directing air into the cavity such that the air may contact the fibers and clean some of the fine particles from the fibers;*

h. *a density control plate having an annular shape and disposed within the housing below the water guide jacket for increasing a density of the fibers below the water guide jacket and for generally inhibiting the water from flowing downwardly in a direction toward the air inlet;*

i. *in one mode of operation of the fine filtering apparatus, the water is directed through the cavity and some of the fine particles are removed from the water producing the clarified water that is discharged from the cavity via the clarified water outlet; and*

j. *in another mode of operation of the fine filtering apparatus, both the air and the water are directed through the cavity and some of the fine particles are cleaned*

from the fibers producing the concentrated waste that is discharged from the cavity through the waste outlet.

6. In Figs. 1-4, Boye discloses "a device and a method for filtering a fluid." Boye, p. 1, line 5. As shown in Fig. 1, Boye teaches an elongated housing (holding member 9) with flexible fibers (fibers 2) that "may be solid or hollow." Boye, p. 7, line 7. The Boye housing in Fig. 1 has a first end portion (inlet end 5) and a second end portion (outlet end 3). Boye further discloses that the first end portion has a water inlet (Fig. 2, fluid inlet pipe 48) and an annular water guide jacket that surrounds the inlets 6 shown in Fig. 1. About the inlets 6, Boye also teaches, "A number of inlets 6 are arranged in the side-wall of the fibre housing 1 near the inlet end 5." Boye, p. 10, lines 32-33. Boye also discloses a header jacket (Fig. 1, includes structure shown at arrow exiting the filter device) that has a clarified water outlet (Fig. 2, before valve 65 connected to pipe 64 leading to filtered fluid container 70) and a waste outlet (Fig. 2, before valve 62 connected to pipe 61 leading to deposit container 60). The Boye apparatus also has an air inlet (Fig. 2, inlet 66) that "may be used for injecting or conducting a liquid, air or a gas into the system to be used for a flushing process." Boye, p. 14, lines 20-21.

7. One further point can be made regarding the recited header jacket. Regarding claims 25 and 41, applicant has argued in the past, "[T]he alleged header jacket in Boye [that] includes both a clarified water outlet and waste outlet is unsupported," and, "Boye does not disclose a device that includes both a clarified water outlet and a concentrated waste outlet." Appeal Brief, June 19, 2009, p. 12, lines 1-2; p. 17, lines 6-7. Header jackets are known in the art that look more like applicant's Fig. 2, filtrate discharge jacket 16. For example, Raff et al. discloses header jackets (Figs. 3, 6, and 9) with clarified water outlets (outlets 15 and 15b) and waste

outlets (outlets 4 and 4b). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have substituted the Boye header jacket for that disclosed in Raff et al., since it was known in the art to provide a clarified water outlet and a waste outlet in a filtering apparatus.

8. Regarding the recited filtering (limitation i) and cleaning modes (limitation j), Boye discloses the two modes in Fig. 2 and states, "[A] major advantage of a filtering device according to the present invention is the possibility of flushing the fibres when the pressure on the fibres is released. The flushing process may be either a forward or a backward flushing process. This is illustrated in Fig. 2." Boye, p. 14, line 24 and p. 13, lines 25-28.

9. Regarding the density control plate, Boye discloses five density control plates (Fig. 1, compressing means 7a and 7B, first inner collar 11 and second inner collar 12; Fig. 3, compressing means 303, ring 314) that are within housing (Fig. 1, holding member 9; Fig. 3, housing 301), some of which are near the water jacket guide (Fig. 1, water jacket guide surrounds inlets 6). Boye further teaches the functional density control limitation when Boye discloses, "[T]he principles of having a fluid filtration wherein a plurality of fibres extend longitudinally in the direction of the fluid flow, and wherein the quality of the filtration is controlled by adjusting the compression and thereby the density of the fibres is known." Boye, p. 2, lines 10-13.

10. In Figs. 1 and 3, Boye discloses the functional limitation of the density control plate inhibiting water from flowing in the direction toward the air inlet and further teaches, "means for passing a liquid and/or a gas through the uncompressed fibres in a direction from the inlet

towards the outlet or in an opposite direction, so as to forward flush or backward flush the device." Boye, p. 8, lines 27-29.

11. Boye discloses the claimed invention except for explicitly showing the density control plate's location below the water jacket guide when the filtering apparatus is set on end. In Fig. 7, Raff et al. discloses this in the context of a "filtration apparatus" with "hollow fibers." Raff et al., col. 1, lines 6-14. Specifically, Raff et al. discloses a density control plate (ring 6b) next to the water jacket guide (expanded part 7b). In Figs. 4 and 7, Raff et al. further teaches an annular water jacket guide analogous to applicant's when Raff et al. shows inlet 4b leading into slots between "fingers or tongues 18a arranged in the expanded part 7a of the housing 2a" where "[t]hese fingers or tongues 18a are integral extensions of the inner wall of the housing 2a." Raff et al., col. 5, lines 8-11.

12. Raff et al. further describes the density control plate (ring 6b) as follows. "Interposed between the end wall (applicant's media fixing plate) and the housing (that includes applicant's water jacket guide) is a ring member (applicant's density control plate). This ring member has a shape that corresponds to the housing and defines a cavity between itself and the hollow fibers. This ring member has a coefficient of adhesion in relation to the end wall which is lower than the coefficient of adhesion in relation to the housing. As a result, the structural integrity of the housing and the seal created by the end wall is enhanced and the risk of cracks therein is substantially eliminated." In other words, the structural integrity of the fibers' seals is enhanced and the risk of cracks is substantially eliminated.

13. To recap, Boye discloses the claimed invention except for explicitly showing the density control plate's location below the water jacket guide when the filtering apparatus is set

on end. Raff et al. teaches this. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Boye filtering apparatus, to have located the density control plate "below" the water jacket guide as taught by Raff et al., since Raff et al. states at col. 2, lines 17-24, that such a modification would enhance the structural integrity of the fiber's seal and substantially eliminate the risk of cracks.

14. Regarding the newly recited limitation in bold-faced type:

d. a header jacket disposed ***extending around a second end portion of the housing;***

Boye explicitly discloses the housing (Fig. 1, holding member 9) extending around the header jacket (Fig. 1, includes structure shown at arrow exiting the filter device) instead of the header jacket extending around the housing, as recited. Spekle et al. teaches the recited configuration in the context of "a separating device, more particularly for hemodialysis," with elastic rings 24, 25, and 26 that form "a constriction of the dialysis space 30." Spekle et al., Abstract, lines 1-2; col. 4, lines 41-42. Specifically, Spekle et al. discloses a header jacket (Fig. 3, collar 23 and ring 4) extending around a second end portion of the housing (Fig. 3, tubular member 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have constructed the Boye filtering apparatus with the header jacket extending around a second end portion of the housing, as taught by Spekle et al., since this is an example of simple substitution of one known element (housing extends around header jacket) for another (header jacket extends around housing) to obtain predictable results (the permeate side of the filtering apparatus is separated from the feed side of the filtering apparatus).

15. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view

of Spekle et al. to teach it is known in the art to extend the header jacket around the second end portion of the housing – discloses or suggests all claim 25 limitations.

16. Independent claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002), in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end.

17. Independent claim 34 is shown below with the keyed structure underlined. With the exception of two limitations, claim 34 recites limitations that were already discussed in claim 25 patentability analysis.

18. Claim 34 is missing the limitation that explicitly recites the header jacket extends around the second end portion of the housing -- for which Spekle et al. was cited for.

19. Claim 34 is also missing the limitation that the fibers are solid, as recited in claim 25. As was discussed in the above claim 25 patentability analysis, Boye discloses flexible fibers (Figs. 1 and 3, fibres 2) that "may be solid or hollow." Boye, p. 7, line 7. As such, Boye, in view of Raff et al., for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, discloses or suggests all claim 34 limitations.

Claim 34. (Currently Amended) A fine filtering apparatus for removing fine particles from water directed from a water source, the device comprising:

a. *an elongated housing forming a main body and having an impervious outer wall comprising a substantial portion of the main body;*

b. *an interior cavity extending through the housing and being substantially enclosed within the outer wall;*

c. *a plurality of flexible fibers extending within the cavity for contacting flowing water and removing fine particles from the water;*

d. *first and second end portions of the housing each disposed adjacent opposite first and second ends of the housing;*

e. *a water inlet disposed on the first end portion for directing the water into the cavity;*

f. *the second end portion of the housing, including a clarified water outlet for discharging clarified water from the cavity and a waste outlet for discharging a concentrated waste from the cavity;*

g. *an air inlet disposed adjacent the first end portion for directing air into the cavity for contacting the fibers and for cleaning some of the fine particles from the fibers;*

h. *a density control plate for increasing the density of the fibers in an area of the cavity between the water inlet and the air inlet and wherein the increased density of the fibers generally inhibits the water from flowing in a direction from the water inlet towards the air inlet, the density control plate comprising an annular plate disposed within the housing between the water inlet and the air inlet and having an opening through which the fibers extend, wherein the annular plate constrains the fibers to the opening thereof, thereby increasing the density of the fibers in the opening of the annular plate and generally inhibiting the flow of*

water from the water inlet, through the opening of the annular plate, to the air inlet;

i. in one mode of operation of the fine filtering apparatus, the water is directed through the cavity and some of the fine particles are removed from the water, producing the clarified water that is discharged via the clarified water outlet; and

j. in another mode of operation of the fine filtering apparatus, both the air and the water are directed through the cavity and some of the fine particles are cleaned from the fibers producing the concentrated waste that is discharged via the waste outlet.

20. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end – discloses or suggests all claim 34 limitations.

21. Table 2 below matches the dependent claims of independent claim 25 to those of independent claim 34. In Table 2 order, the patentability analyses of the dependent claims follow, with each dependent claim limitation discussed only once.

Table 2: Dependent claims of independent claim 25 matched to those of independent claim 34.

Claim 25	***Claim 34***
Boye – in view of ***Raff et al.*** for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of ***Spekle et al.*** to teach it is known in the art to extend the header jacket around the second end portion of the housing – discloses or suggests all ***claim 25*** limitations.	***Boye*** – in view of ***Raff et al.*** for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end – discloses or suggests all ***claim 34*** limitations.
Claim 26	Claim 35
Claim 28	Claim 36
	Claim 53
Claim 31	Claim 39
Claim 27 – in further view of Ford et al. for the polypropylene fiber material.	

Claim 29 – in further view of Zha et al. for the location of the air supply holes in the media fixing plate.	Claim 37– in further view of Zha et al. for the location of the air supply holes in the media fixing plate.
Claim 30– in further view of Zha et al. for the location of the air supply holes in the media fixing plate.	Claim 38– in further view of Zha et al. for the location of the air supply holes in the media fixing plate.
Claims 32 and 33 – in further view of Barzuza et al. for the porous chamber.	Claim 40 – in further view of Barzuza et al. for the porous chamber.

22. Dependent claims 26, 28, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002), in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Spekle et al. (U.S. Patent No. 4,219,426, Aug. 26, 1980) to teach that it is known in the art to extend the header jacket around the second end portion of the housing – as applied to claim 25 above.

23. Dependent claims 35, 36, 39, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002), in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end – as applied to claim 34 above.

24. Claims 26 and 28 are analogous to claims 35 and 36. Claim 53 depends on claim 35 and recites that the fibers are solid – a limitation already discussed in the claim 25 patentability analysis. The five claims are shown below with the keyed structure underlined.

> *Claim 26. (Previously Presented) The fine filtering apparatus of claim 25 wherein first ends of the fibers are secured to a media fixing plate disposed near a first end of the housing and wherein second ends of the fibers are disposed near a second end of the housing, the second ends of the fibers being unattached and free to move about in the cavity as water passes through the cavity; and wherein the fibers are non-tubular and non-membranous.*

Claim 35. (Previously Presented) The fine filtering apparatus of claim 34 wherein first ends of the fibers are secured to a media fixing plate disposed near the first end of the housing and wherein second ends of the fibers are disposed near the second end of the housing, and are unattached and free to move about; and wherein the fibers are non-tubular and non-membranous.

Claim 53. (New) The fine filtering apparatus of claim 35 wherein the flexible fibers remove fine particles from the water without separating a permeate from the water.

Claim 28. (Currently Amended) The fine filtering apparatus of claim 26 wherein the including a density control plate increases the density of fibers in an area of the cavity between the water guide jacket and the media fixing plate and wherein the increased density of the fibers generally inhibits the water from flowing in a direction from the water guide jacket towards the media fixing plate, the density control plate comprising having an annular shaped plate disposed within the housing between the media fixing plate and the annular water guide jacket and having an opening through which the fibers extend, wherein the annular (density control) *plate constrains the fibers to the opening thereof, thereby increasing the density of the fibers in the opening of the annular* (density control) *plate and generally inhibiting the water from flowing from the water guide jacket to the media fixing plate.*

Claim 36. (Currently Amended) The fine filtering apparatus of claim 34 wherein the including a density control plate having an annular shape and is disposed within the housing between a media fixing plate and the water inlet, the density control plate increasing a density of fibers between the media fixing plate and the water inlet.

25. Regarding dependent claims 26 (also claim 35) and claim 28 (also claim 36) – Boye discloses that the fibers are attached to a media fixing plate near the inlet and the fibers are free to move near the outlet [claims 26 and 35] with the statement, "When arranging the fibres in the fibre housing it is preferred that the fibres at the inlet end of the fibre housing are attached to an end part of the fibre housing. . . In a preferred embodiment, the fibres have free fibre ends at the opposite end of the inlet end of the fibre housing." Boye, p. 7, lines 19-20 and 23-24. Boye also teaches that the fibers extend through an opening in each of the disclosed density control plates [claims 28 and 36]. Boye, Fig. 1, fibres 2 extend through an opening in first inner collar 11, compressing means 7a and 7b, and second inner collar 12; Fig. 3, fibres 2 extend through an opening in ring 314 and compression means 304.

26. Claims 28 and 36 also recite locating the density control plate below the water jacket guide, as was discussed in the claim 25 and claim 34 patentability analyses, and above the media fixing plate. Boye, in view of Raff et al., discloses the limitation. Specifically, in Fig. 7, Raff et al. further teaches that the density control plate (ring 6b) is below the water jacket guide (expanded part 7b) and above the media fixing plate (hollow fibers 1b arranged in housing 2b where the media fixing plate is shown within restricted part 5b) when the filtering apparatus is set on end. Raff et al. describes the density control plate (ring 6b) as follows. "Interposed

between the end wall (applicant's media fixing plate) and the housing (that includes applicant's water jacket guide) is a ring member (applicant's density control plate). This ring member has a shape that corresponds to the housing and defines a cavity between itself and the hollow fibers. This ring member has a coefficient of adhesion in relation to the end wall which is lower than the coefficient of adhesion in relation to the housing. As a result, the structural integrity of the housing and the seal created by the end wall is enhanced and the risk of cracks therein is substantially eliminated." In other words, the structural integrity of the fibers' seals is enhanced and the risk of cracks is substantially eliminated.

27. To recap, Boye, in view of Raff et al., discloses the claimed limitation. Raff et al. further teaches that the density control plate (ring 6b) is below the water jacket guide (expanded part 7b) and above the media fixing plate (hollow fibers 1b arranged in housing 2b where the media fixing plate is shown within restricted part 5b) when the filtering apparatus is set on end. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Boye filtering apparatus, to have located the density control plate "below" the water jacket guide and "above" the media fixing plate as taught by Raff et al., since Raff et al. states at col. 2, lines 17-24, that such a modification would enhance the structural integrity of the fiber's seal and substantially eliminate the risk of cracks.

28. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Spekle et al. to teach that it is known in the art to extend the header jacket around the second end portion of the housing – discloses or suggests all limitations recited in claims 26 and 28.

29. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end – discloses or suggests all limitations recited in claims 35, 36, and 53.

30. Claim 31 is analogous to claims 39. The two claims are shown below with the keyed structure underlined.

> *Claim 31. (Previously Presented) The fine filtering apparatus of claim 25 wherein an array of openings is disposed in a circumferential band around the outer wall of the housing, the array of openings in the outer wall being aligned with the annular water guide jacket to conduct the water into the cavity and to distribute the water within the cavity.*
>
> *Claim 39. (Previously Presented) The fine filtering apparatus of claim 34 wherein an array of openings is disposed in a circumferential band around the outer wall of the housing, the array of openings being aligned with the water inlet which includes an annular water guide jacket to conduct the water into the cavity and to distribute the water within the cavity.*

31. Regarding claims 31 and 39, Boye, in view of Raff et al., discloses the claimed invention. In Fig. 1, Boye further teaches the recited openings in the water guide jacket [claims 31 and 39] in the form of inlets 6.

32. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view

of Spekle et al. to teach that it is known in the art to extend the header jacket around the second end portion of the housing – discloses or suggests all claim 31 limitations.

33. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end – discloses or suggests all claim 39 limitations.

34. Dependent claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002), in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Spekle et al. (U.S. Patent No. 4,219,426, Aug. 26, 1980) to teach that it is known in the art to extend the header jacket around the second end portion of the housing, as applied to claim 25 above – in further view of Ford et al. (US Patent No. 4,793,932, Dec. 27, 1988) for polypropylene fiber material.

35. Claim 27 is shown below with the keyed terms underlined.

Claim 27. (Previously Presented) The fine filtering apparatus of claim 25 wherein one or more of the fibers is formed from a material selected from a group including polyamide, polyester, and polypropylene.

Boye, in view of Raff et al. and Spekle et al., discloses the claimed invention. Boye further teaches, "[T]he fibers may be solid or hollow" and "[i]n a preferred embodiment the fibres comprise polyester or nylon fibres." Boye, p. 7, lines 7-9.

36. Boye discloses the claimed invention except for explicitly stating that the fibers are polypropylene. Ford et al. teaches polypropylene fibers as the preferred embodiment in the

context of a "Variable Volume Filter or Concentrator" used "for concentrating the fine solids of a liquid feed suspension" shown in Fig. 1. Ford et al., Title; Abstract, lines 1-3; Fig. 1; col. 4, lines 35-45. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Boye filtering apparatus, to have made the flexible fibers of polypropylene, as taught by Ford et al. since Ford et al. states, in the Title and in the Abstract, lines 1-3, that such modification was a preferred polymeric fiber in a "Variable Volume Filter or Concentrator" used "for concentrating the fine solids of a liquid feed."

37. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Spekle et al. to teach that it is known in the art to extend the header jacket around the second end portion of the housing, as applied to claim 25 above – in further view of Ford et al. for polypropylene fiber material, discloses or suggests all claim 27 limitations.

38. Dependent claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002) – in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Spekle et al. (U.S. Patent No. 4,219,426, Aug. 26, 1980) to teach that it is known in the art to extend the header jacket around the second end portion of the housing, as applied to claim 25 above – in further view of Zha et al. (U.S. Patent No. 6,524,481 B2, Feb. 25, 2003) for the location of the air supply holes in the media fixing plate.

39. Dependent claims 37 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002) – in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, as applied to claim 34 above – in further view of Zha et al. (U.S. Patent No. 6,524,481 B2, Feb. 25, 2003) for the location of the air supply holes in the media fixing plate.

40. Claims 29 and 30 are analogous to claims 37 and 38. The four claims are shown below with the keyed structure underlined.

Claim 29. (Currently Amended) The fine filtering apparatus of claim 25 including one or more air supply holes disposed in a member within the housing for conducting air into the cavity and dispersing air within the cavity and about the fibers.

Claim 37. (Currently Amended) The fine filtering apparatus of claim 34 including on or more air supply holes in a member disposed within the housing for conducting the air into the cavity and dispersing the air about the fibers.

Claim 30. (Currently Amended) The fine filtering apparatus of claim 29 wherein the one or more air supply holes form an array of air supply holes disposed in a media fixing plate, the array of air supply holes being disposed adjacent ends of the fibers that are secured in the (media fixing) *plate and which act to disperse the air about the fibers.*

Claim 38. (Currently Amended) The fine filtering apparatus of claim 34 including an array of air supply holes in a media fixing plate disposed within the housing, the (media fixing) *plate having ends of the fibers secured thereto, the array of openings* (air supply holes) *disposed adjacent the ends of the fibers for conducting the air into the cavity and dispersing the air about the fibers.*

41. Regarding dependent claims 29, 30, 37, and 38, Boye discloses an array air supply holes within a plate in Fig. 3, where, "[T]he liquid or fluid may pass from the inlet(s) through the mounting 310 (applicant's air supply holes within a plate), along the fibre-head 309 (applicant's media fixing plate), and then enter into the bundle of fibres along the outer side of the bundle 302." Boye, p. 17, lines 30-32. Boye teaches air through the plate when Boye discloses, "In Fig. 2 is also shown an inlet 66 . . . The inlet 66 may be used for injecting or conducting a liquid, air or a gas into the system to be used for a flushing process." Boye, p. 14, lines 18 and 20-21.

42. Boye, in view of Raff et al. and Spekle et al., discloses the claimed limitations including holes in a plate through which air is supplied -- but does not disclose the air supply holes in the media fixing plate, as recited. Zha et al. discloses these in Figs. 1 and 9 in the form of an "apparatus for cleaning a membrane module" where liquid and gas "bubbles entrained therein move past the surfaces of the membranes to dislodge fouling materials therefrom." Zha et al., Abstract, lines 1 and 8-10. Zha et al. further teaches, "As shown in FIG. 9, the lower potting head 48 (applicant's media fixing plate) is provided with a number of parallel arranged slot type aeration holes 52. The fibre membranes 53 are potted in bundles 46 to form a partitioned arrangement having spaces 54 extending transverse of the fibre bundles. The aeration holes 52

(applicant's air supply holes within the media fixing plate) are positioned to generally coincide with the partition spaces, though there is generally a number of aeration holes associated with each space." It would have been obvious to one having ordinary skill in the art at the time the invention was made to have located air supply holes in the Boye media fixing plate, as taught by Zha et al., since Zha et al. states in the Abstract, lines 1 and 9-10, that such a modification would provide an "apparatus for cleaning a membrane module" where liquid and gas "bubbles entrained therein move past the surfaces of the membranes to dislodge fouling materials therefrom."

43. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Spekle et al. to teach that it is known in the art to extend the header jacket around the second end portion of the housing, as applied to claim 25 above – in further view of Zha et al. for the location of the air supply holes in the media fixing plate, discloses or suggests all limitations recited in claims 29 and 30.

44. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, as applied to claim 34 above – in further view of Zha et al. for the location of the air supply holes in the media fixing plate, discloses or suggests all limitations recited in claims 37 and 38.

45. Dependent claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002) – in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Spekle et al. (U.S. Patent No.

4,219,426, Aug. 26, 1980) to teach that it is known in the art to extend the header jacket around the second end portion of the housing, as applied to claim 25 above – in further view of Barzuza et al. (US Patent No. 4,617,120, Oct. 14, 1986) for the porous chamber.

46. Dependent claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002) – in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, as applied to claim 34 above – in further view of Barzuza et al. (US Patent No. 4,617,120, Oct. 14, 1986) for the porous chamber.

47. Claims 32, 33, and 40 are shown below in italics with the keyed structure underlined.

Claim 32. (Previously Presented) The fine filtering apparatus of claim 25 including a porous chamber in fluid communication with the clarified water outlet, the (porous) *chamber disposed in the second end portion of the housing and projecting in among the fibers to receive the clarified water from the cavity.*

Claim 33. (Previously Presented) The fine filtering apparatus of claim 32 wherein a volume of the porous chamber is about 10% to about 50% of a volume of the cavity.

40. (Previously Presented) The fine filtering apparatus of claim 34 including a (porous) *chamber having an array of openings in an outer wall thereof, the* (porous) *chamber in fluid communication with the clarified water outlet, and the* (porous) *chamber disposed in the second end portion of the housing and projecting in among the fibers for receiving the clarified water.*

48. Boye, in view of Raff et al., discloses the claimed limitation except that the chamber leading to the clarified water outlet is above the fibers instead of the chamber leading to the clarified water outlet being a porous chamber projecting into the cavity, as recited. Barzuza et al. teaches that it is known in the water filtration art to place a skirt of solid flexible fibers (fibers 6) around a porous chamber (filter tube 2 having perforations 4). Barzuza et al., col. 1, lines 9-14; Figs. 1 and 20-23; col. 3, lines 1-4. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Boye filtering apparatus, to have projected the porous chamber into the cavity as taught by Barzuza et al., since Barzuza et al. states at col. 1, lines 43-46 that such a modification would "provide a fluid filtering device that is self-cleaning by a flushing process and is both reliable and inexpensive."

49. Claim 33 recites a porous chamber that fills 10% to 50% of the cavity volume. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Boye filtration apparatus, to have made the porous chamber 10% to 50% of the cavity volume, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

50. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Spekle et al. to teach that it is known in the art to extend the header jacket around the second end portion of the housing, as applied to claim 25 above – in further view of Barzuza et al. for the porous chamber, discloses or suggests all limitations recited in claim 32 and 33.

51. To summarize, Boye – in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, as applied to claim 34 above – in further view of Barzuza et al. for the porous chamber, discloses or suggests all claim 40 limitations.

Claim Rejections - 35 USC § 103
Method to Use Fine Filtering Apparatus Recited In Claims 41-44, 46-50, and 52

52. Claims 41, 42, 46, and 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002), in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Cote et al. (U.S. Patent No. 5,607,593, Mar. 4, 1997) for teaching air injection through the media fixing plate instead of just above it.

53. Independent claim 41 is shown below with the keyed structure underlined. The amended claim has three new limitations shown in bold-faced type.

> *Claim 41. (Currently Amended) A method of treating water having fine particles therein with a* (filtering apparatus) *device having a treatment cavity, an air inlet and a* ***water guide jacket*** *comprising a* ***water inlet*** *disposed on one portion of the* (filtering apparatus) *device, and a clarified water outlet and a concentrated waste outlet disposed on another portion of the* (filtering apparatus) *device, the method including:*
>
> *a. closing the concentrated waste outlet and opening the clarified water outlet;*
>
> *b. directing the water into the water inlet and through the treatment cavity;*

c. ***increasing the density of a plurality of flexible fibers extending within in the treatment cavity in an area below the water guide jacket using a density control plate to inhibit the water from flowing downwardly in a direction toward the air inlet;***

d. *as the water is passed through the treatment cavity, flowing the water adjacent the plurality of flexible fibers extending within the treatment cavity and removing fine particles from the water without separating a permeate from the water;*

e. *discharging the clarified water out the clarified water outlet;*

f. *closing the clarified water outlet and opening the concentrated waste outlet;*

g. ***injecting air from the air inlet into the treatment cavity through openings (air supply holes) disposed in the media fixing plate** to which the fibers are attached and mixing the air with the water having the fine particles to form an air-water mixture;*

h. *passing the air-water mixture through the treatment cavity and contacting the fibers and dislodging the fine particles captured on the fibers, producing a concentrated waste including the air-water mixture and the dislodged fine particles; and*

i. *discharging the concentrated waste through the concentrated waste outlet.*

54. Claim 41 recites the use of a filtering apparatus. As can be seen from the Table 1 key above and the claim 34 patentability analysis, claim 41 recites apparatus structure disclosed by Boye, in view of Raff et al. with two new limitations – (1) water enters the filtering apparatus

through the water guide jacket and (2) air enters the filtering apparatus through the media fixing plate. Each limitation will be discussed in turn.

55. Regarding the limitation:

Claim 41 . . .

***a water guide jacket comprising a water inlet** disposed on one portion of the (filtering apparatus) device*

Boye discloses a water guide jacket (fig. 1, structure that surrounds inlets 6) with a water inlet (Figs. 1 and 2, fluid inlet pipe 48) disposed on one end of the filtering apparatus (Figs. 1-4, filtering device), as recited.

56. Regarding the limitation:

Claim 41 . . .

injecting air from the air inlet into the treatment cavity through openings (air supply holes) disposed in the media fixing plate

Boye discloses injecting air from the air inlet (Figs. 1 and 2, air inlet 66 that leads into water inlet 48) into the cavity (Fig. 1, housing with cavity is holding member 9 that includes housing member 1) through openings disposed *above* the media fixing plate (Fig. 1, black rectangle at inlet end 5) but not through openings disposed *in* the media fixing plate as recited. In Fig. 11, Cote et al. discloses the latter in the context of "a water-treatment installation that can implement many variants of filtration and backwashing methods and can be set up according to numerous constructional variants." Cote et al., col. 2, lines 49-52.

57. To recap, Boye, in view of Raff et al. discloses the claimed invention, except that Boye teaches injecting air above the media fixing plate and not through the media fixing plate, as

recited. Cote et al. discloses that it is known in the art to inject air through the media fixing plate. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Boye filtering apparatus , to have changed the air injection from above the media fixing plate to through the media fixing plate, as taught by Cote et al., since this is an example of simple substitution of one known element (air injection above the media fixing plate) for another (air injection through the media fixing plate) to obtain predictable results (air is injected into the cavity).

58. Regarding the recited apparatus structure in method claim 41 then – Boye, in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Cote et al. for teaching air injection through the media fixing plate instead of just above it, discloses the filtering apparatus. The method recited in independent claim 41 will be analyzed next for patentability.

59. To paraphrase independent method claim 41, applicant uses the filtering apparatus as follows:

(1) Close the waste outlet line and open the clarified water outlet line.

(2) Feed raw water through the water inlet into the housing.

(3) Use the density control plate to increase the density of fibers in an area below the water guide jacket – thus inhibiting water flow downward (in the direction of the air inlet).

(4) Discharge the clarified water from the clarified water outlet.

(5) Close the clarified water outlet discharge line and open the waste outlet line.

(6) Inject air into the housing to form an air-water mixture through air supply holes in the media fixing plate.

(7) Let the air-water mixture pass through the housing to clean the flexible fibers.

(8) Discharge concentrated waste through the waste outlet line.

60. As shown in the key above, Boye, in view of Raff et al., discloses the claimed apparatus. Boye further teaches the claimed method in Fig. 2, beginning with all valves closed.

(1) Close the waste outlet line (close valve 62) and open the clarified water outlet line (open valve 65).

(2) Feed raw water (open valve 69 and turn pump 52 on) through the water inlet (open valve 55) into the housing (filtering device 41).

(3) Use the density control plate (Fig. 1, compressing means 7a and 7b, first inner collar 11 and second inner collar 12; Fig. 3, compressing means 303, ring 314; Raff et al., Fig. 7, ring 6b) to increase the density of fibers (Fig. 1, fibers 2 and Fig. 3, fibers 302 that "may be solid or hollow," Boye, p. 7, line 7) in an area below the water guide jacket (Fig. 1, structure that surrounds inlets 6; Raff et al., Fig. 7, expanded part 7b; Figs. 4 and 7 with col. 5, lines 8-11) – thus inhibiting water flow downward in the direction of the air inlet (Figs. 1 and 2, air-inlet 66 into pipe 48 into water jacket guide or the structure that surrounds inlets 6).

(4) Discharge the clarified water (through pipe 64 to filtered container 70) from the clarified water outlet (from open valve 65).

(5) Close the clarified water outlet discharge line (close valve 65) and open the waste outlet line (open valve 62).

(6) Inject air (air inlet 66 through open valves 67 and 57) into the housing (filtering device 41) to form an air-water mixture through air supply holes in the media fixing plate (Fig. 1, black rectangle at inlet end 5).

Regarding the air supply holes, as stated in the above paragraphs, Boye discloses injecting air from the air inlet (Figs. 1 and 2, air inlet 66 that leads into water inlet 48) into the cavity (Fig. 1, housing with cavity is holding member 9 that includes housing member 1) through openings disposed *above* the media fixing plate (Fig. 1, black rectangle at inlet end 5) but not through openings disposed *in* the media fixing plate as recited. In Fig. 11, Cote et al. discloses the latter in the context of "a water-treatment installation that can implement many variants of filtration and backwashing methods and can be set up according to numerous constructional variants." Cote et al., col. 2, lines 49-52.

(7) Let the air-water mixture pass through the housing (filtering device 41) to clean the flexible fibers.

(8) Discharge concentrated waste (through pipe 61 to deposit container 60) through the waste outlet line (valve 62).

61. In summary, Boye, in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Cote et al. for teaching air injection through the media fixing plate instead of just above it., discloses or suggests all limitations recited in claim 41.

62. Dependent claims 42, 46, and 48-50 appear below in italics with the keyed structure underlined.

Claim 42. (Previously Presented) The method of claim 41 wherein respective fibers include opposed ends, and wherein one end of each fiber is fixed while the other end is unattached and free to move about as the water or air-water mixture passes through the treatment cavity; and wherein the fibers are non-tubular and non-membranous.

Claim 46. (Previously Presented) The method of claim 41 wherein directing the water into the treatment cavity includes directing the water through an array of openings in a circumferential band extending around an outer wall that surrounds the treatment cavity and distributing the water within the cavity.

Claim 48. (Previously Presented) The method of claim 41 including generating turbulence in the treatment cavity by contacting the water with the fibers.

49. (Previously Presented) The method of claim 41 wherein the treatment cavity is formed by an elongated housing and wherein the air inlet and water inlet are disposed adjacent one end portion of the housing and the clarified water outlet and concentrated waste outlet are disposed adjacent an opposite end portion of the housing, and wherein the housing is cylindrical and the fibers extend generally longitudinally through the cavity as the water passes in contact with the fibers.

50. (Previously Presented) The method of claim 41 wherein the clarified water is discharged out the clarified water outlet while the concentrated waste outlet is closed and wherein the concentrated waste is discharged through the concentrated waste outlet while the clarified water outlet is closed.

63. As can be seen from the Table 1 key and the discussion above, claims 42, 46, and 48-50 recite apparatus structure disclosed by Boye, in view of Raff et al. and Cote et al.. As will be shown next, Boye discloses the claimed method recited in claims 42, 46, and 48-50.

64. Regarding claims 42, 46, and 49 – These claims recite various apparatus limitations already discussed and the analogous patentability analyses will not be repeated here. No further limitations on the claimed method are recited.

65. Claim 48 recites generating turbulence by contacting water with the fibers. Regarding Fig. 3, Boye discloses, "It is preferred that a ring 314 for providing a turbulent liquid flow, such as for example during the flushing process, is arranged at the inner wall of the housing 301." Boye, p. 18, lines 7-9.

66. Claim 50 recites discharging clarified water when the concentrated waste outlet is closed – or closing the clarified water outlet while the concentrated waste outlet is discharged. Boye discloses this in Fig. 2. There, valve 65 is open to discharge clarified water to the filtered fluid container 70 through pipe 64 and, simultaneously, valve 62 is closed to close the concentrated waste outlet. Similarly, valve 65 is closed to close the clarified water outlet and, simultaneously, valve 62 is open to discharge concentrated waste to the deposit container 60 through pipe 61.

67. In summary, Boye, in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Cote et

al. for teaching air injection through the media fixing plate instead of just above it., discloses or suggests all limitations recited in dependent claims 42, 46, and 48-50.

68. Regarding dependent claims 43, 44, 47, and 52 – These methods claims recite apparatus limitations already discussed above. The methods claims patentability analyses, then, are analogous to those of the apparatus claims. Specifically, claims 43 and 52 recite density control plate limitations; claim 44 recites a media fixing plate structure with air supply holes disposed adjacent the fibers; claim 47 recites porous chamber limitations. The details of the rejections follow – along with the claims in italics and the keyed structure underlined.

69. Claims 43 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002), in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Cote et al. (U.S. Patent No. 5,607,593, Mar. 4, 1997) for teaching air injection through the media fixing plate instead of just above it.

70. Dependent claims 43 and 52 appear below in italics with the keyed structure underlined.

Claim 43. (Previously Presented) The method of claim 41 wherein increasing the density includes extending the density control plate around a portion of the fibers and generally compressing the fibers in an area of the treatment cavity.

Claim 52. (New) The method of claim 41 including extending the flexible fibers through a generally central opening formed in an annular (density control) *plate that is disposed*

between the water inlet and the air inlet such that the flexible fibers are constrained by the opening in the annular (density control) *plate and the density of the flexible fibers in the opening of the annular* (density control) *plate generally inhibits the flow of water from the water inlet to the air inlet.*

71. As can be seen from the Table 1 key and the discussion above, claims 43 and 52 recite limitations on the density control plate structure already discussed and the analogous patentability analyses will not be repeated here. In Fig. 1, Boye discloses compressing the fibers in the cavity by means of the density control plate [claim 43].

72. In summary, Boye, in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Cote et al. for teaching air injection through the media fixing plate instead of just above it, discloses or suggests all limitations recited in claims 43 and 52.

73. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002), in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Cote et al. (U.S. Patent No. 5,607,593, Mar. 4, 1997) for teaching air injection through the media fixing plate instead of just above it.

74. Dependent claim 44 appears below in italics with the keyed structure underlined.

Claim 44. (Currently Amended) The method of claim 41 directing the air into the cavity through one or more air supply holes disposed adjacent the fibers.

75. Boye, in view of Raff et al. and Cote et al., discloses the claimed invention. Boye further teaches openings disposed adjacent the fibers (Fig. 1, fibers 2) to direct air into the housing with a cavity (Fig. 1, holding member 9 that includes housing member 1). As discussed above in claim 41, in Fig. 11, Cote et al. explicitly teaches air supply holes disposed adjacent the fibers directing air into the housing with a cavity similar to applicant's air supply holes 14 in Fig. 6. Cote et al. discloses air supply holes in the context of "a water-treatment installation that can implement many variants of filtration and backwashing methods and can be set up according to numerous constructional variants." Cote et al., col. 2, lines 49-52. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have constructed the Boye filtering apparatus with air supply holes adjacent the fibers like applicant's Fig. 6, as taught by Cote et al., since Cote et al. states at col. 2, lines 49-52 that this is one constructional variant, of many, that can be implemented in "a water-treatment installation" that can carry out "filtration and backwashing methods."

76. In summary, Boye, in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Cote et al. for teaching air injection through the media fixing plate instead of just above it, discloses or suggests all claim 44 limitations.

77. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boye (WO 02/24306 A1, Mar. 28, 2002), in view of Raff et al. (U.S. Patent No. 5,053,130, Oct. 1, 1991) for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Cote et al. (U.S. Patent No. 5,607,593, Mar. 4, 1997)

for teaching air injection through the media fixing plate instead of just above it, as applied to claim 41 above, in further view of Barzuza et al. (US Patent No. 4,617,120, Oct. 14, 1986) for the porous chamber.

78. Dependent claim 47 appears below in italics with the keyed structure underlined.

Claim 47. (Previously Presented) The method of claim 41 including directing the clarified water into a porous chamber in fluid communication with the clarified water outlet, the (porous) chamber disposed in the treatment cavity and projecting in among the fibers when the water or air-water mixture is passing through the treatment cavity.

79. As can be seen from the Table 1 key and the discussion above, claim 47 recites limitations on the porous chamber structure already discussed and the analogous patentability analyses will not be repeated here. No further limitations on the claimed method are recited.

80. In summary, Boye, in view of Raff et al. for the density control plate's location explicitly shown below the water jacket guide when the filtering apparatus is set on end, in view of Cote et al. for teaching air injection through the media fixing plate instead of just above it, in further view of Barzuza et al. for the porous chamber discloses or suggests all claim 47 limitations.

Response to Arguments

81. Some of applicant's arguments with respect to claims 25, 34, and 41 have been considered but are moot in view of the new ground(s) of rejection. The remainder of applicant's arguments in the response, filed December 21, 2009, has been fully considered but they are not persuasive.

82. Applicant's arguments are listed below with the examiner's response after each argument.

a. Regarding claims 25, 34, and 41, applicant argues, "Nothing in Raff describes that ring 6b controls the density of the fibers to inhibit the water from flowing in a downward direction, as claimed. Instead, Raff's ring 6b provides a reduced attachment between the wall 3b and the housing 2b to prevent cracks in the end wall and the housing 2b when the filtration device is cured." Applicant's Remarks, lines 4-8. Applicant further argues, "Nothing in either reference requires that the alleged density control plate be placed between an end wall and the housing at a location below the alleged water jacket guide." Applicant's Remarks, p. 17, line 22 to p. 18, line 1.

The limitation under discussion is shown below.

Claim 25 . . .

h. a density control plate having an annular shape and disposed within the housing below the water guide jacket for increasing a density of the fibers below the water guide jacket and for generally inhibiting the water from flowing downwardly in a direction toward the air inlet; . . .

Claim 34 . . .

the density control plate comprising an annular plate disposed within the housing between the water inlet and the air inlet and having an opening through which the fibers extend, wherein the annular plate constrains the fibers to the opening thereof, thereby increasing the density of the fibers in the opening of the annular plate and generally inhibiting the flow of water

from the water inlet, through the opening of the annular plate, to the air inlet; . . .

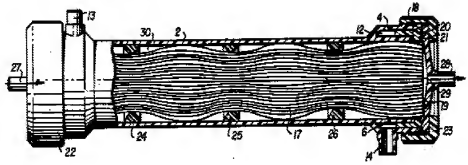
Claim 41 . . .

c. *increasing the density of a plurality of flexible fibers extending within in the treatment cavity in an area below the water guide jacket using a density control plate to inhibit the water from flowing downwardly in a direction toward the air inlet;*

The examiner responds as in the above patentability analysis. It is known in the art to use rings in one of two ways, depending on the location. Along the length of the fibers, rings are used control the density within the fiber bundle. Spekle, Fig. 3, rings 24, 25, and 26 provide an example of this. At the end of the fiber bundle, rings ensure the structural integrity of the seal around the fibers such that the fibers do not break off from the media fixing plate. Raff et al., Fig. 7, ring 6b provides an example of this. Both Spekle, Fig. 3, rings 24, 25, and 26 and Raff et al., Fig 7, ring 6b are shown below.

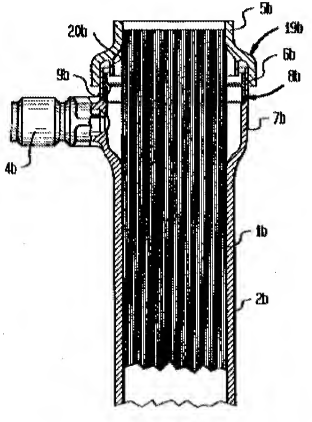
Along the length of the fibers, rings are used control the density within the fiber bundle. Spekle, Fig. 3, rings 24, 25, and 26 provide an example of this.

FIG. 3



At the end of the fiber bundle, rings ensure the structural integrity of the seal around the fibers such that the fibers do not break off from the media fixing plate. Raff et al., Fig. 7, ring 6b provides an example of this.

FIG. 7



In the patentability analysis above, Boye was cited for disclosing the ring with the "density control" function that applicant recites by using the term "density control plate." Raff et al. was cited for the location of the ring below the water inlet that applicant also recites. Both ring locations and their functions are known in the art, as evidenced above by Spekle, Fig. 3, rings 24, 25, and 26; and Raff et al., Fig. 7, ring 6b shown below.

The prior art discloses a wealth of these rings. Boye, instead of Spekle, was chosen to be the primary reference. This is because Boye addresses nearly all claimed features and their use – in view of some secondary references cited to explicitly teach the details of the filtering apparatus ends. See the patentability analyses above.

In summary, then, Boye discloses the claimed invention except for explicitly showing the density control plate's location below the water jacket guide when the filtering apparatus is set on end. Raff et al. teaches this. Raff et al. further provides motivation to combine with Boye teachings and locate the Boye density control plate "below" the water jacket guide when Raff et al. states at col. 2, lines 17-24, that such a modification would enhance the structural integrity of the fiber's seal and substantially eliminate the risk of cracks.

Regarding the recitation of inhibiting the water from flowing downwardly in a direction toward the air inlet, Boye discloses this since compressing the fiber bundles *inhibits water flow within the fiber bundle "in the direction of the air inlet,"* when the

air inlet and the density control plate are on opposite sides of the media fixing plate – as they are in the Boye filtering apparatus.

b. Regarding claims 25, 34, and 41, applicant argues, "[I]t would be impossible to place a density control plate between an end wall and the housing 1 in Boye." Applicant's Remarks, p. 17, lines 14-15.

In response to applicant's argument that it would be impossible to place a density control plate between an end wall and the Boye housing (Fig. 1, holding member 9 that includes housing member 1), the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

c. Regarding claims 25, 34, and 41, applicant argues, "[O]ne of ordinary skill in the art would not be motivated to place a density control plate below the alleged water guide jacket in Boye because Boye expressly teaches placing the alleged density control plate above the alleged water guide jacket. For instance, Boye states that '[i]n order to obtain sufficient space for the deposited particles and in order to avoid early clogging of the filtering device, the jaws 7afb, and thereby the location of the compressing 8 is preferably arranged so that about 2/3 of the length of the fibre housing is on the inlet

side of the jaws 7a/b...' Boye, p. 12, lines 14-17. Thus, placing the alleged density control plate below the alleged water guide jacket, would position the alleged density control plate such that the deposited particles would clog the filtering device." Applicant's Remarks, p. 18, lines 3-12.

The examiner responds as in the above patentability analysis and Point (a). Raff et al. was cited for the location of the density control plate below the water inlet. Furthermore, the passage that applicant cites for one of the five embodiments of the Boye density control rings does not teach away because MPEP 2123 states, "Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971)."

d. Regarding claim 30, applicant argues, "One of ordinary skill in the art would not modify Boye to include Zha's air supply holes in the media fixing plate because Boye already describes several ways to dislodge fouling materials from the membranes." Applicant's Remarks, p. 7-10.

In response to applicant's argument that there is no teaching, suggestion, or motivation to combine the references, the examiner recognizes that obviousness may be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed.

Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007).

In this case, Boye, in view of Raff et al. and Spekle et al., discloses the claimed limitations including holes in a plate through which air is supplied -- but does not disclose the air supply holes in the media fixing plate, as recited. Zha et al. discloses these. Zha et al. further provides motivation for locating the air supply holes in the Boye media fixing plate, when Zha et al. states in the Abstract, lines 1 and 9-10, that such a modification would provide an "apparatus for cleaning a membrane module" where liquid and gas "bubbles entrained therein move past the surfaces of the membranes to dislodge fouling materials therefrom." In other words, this is an example of simple substitution of one known element (air supply holes located as in Zha et al. and as recited) for another (air supply holes located as in Boye) to obtain predictable results (a filtration apparatus that provides gas entrained in liquid to clean the membranes within).

Conclusion

83. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

84. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

85. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Denise R. Anderson whose telephone number is (571)270-3166. The examiner can normally be reached on Monday through Thursday, from 8:00 am to 6:00 pm.

86. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter D. Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

87. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DRA/

/Walter D. Griffin/
Supervisory Patent Examiner, Art Unit 1797